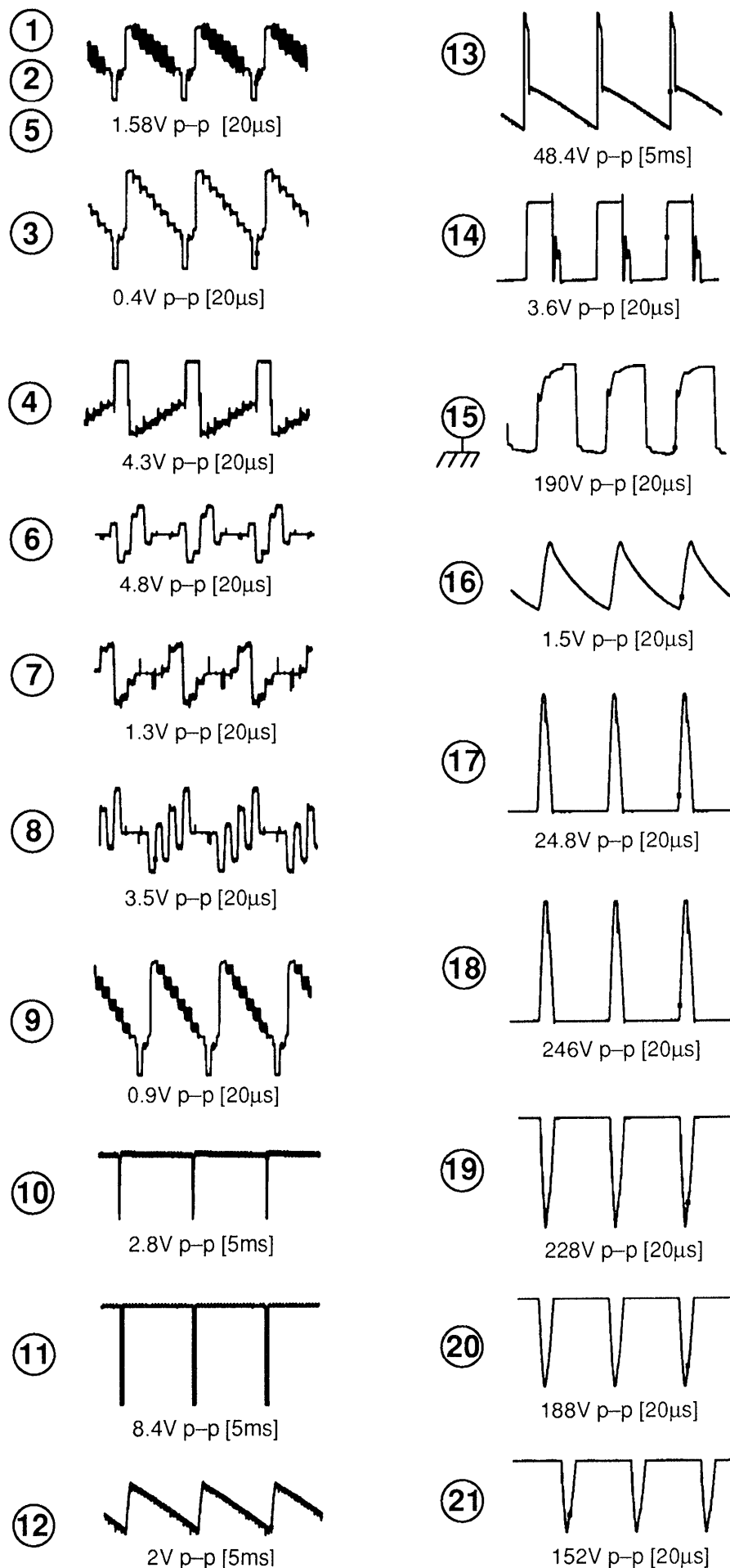


Waveforms – A Schematic

All Waveforms are (≡) Cold Ground except No. 15 which is (≡) Hot Ground.



Waveform Measurements

- Taken with a standard gated rainbow generator connected to antenna terminal.
- Secondary Operating Controls (Video/Audio Menu) are set to Normalize, Volume "MIN".
- All video and color waveforms taken with a wideband scope and a probe with low capacity (10 to 1). Shape and peak amplitudes may vary depending on type of Oscilloscope used and calibration.
- Ground symbol (≡) (HOT) or (≡) (COLD) indicates ground lead connection of Oscilloscope.

CAUTION: Incorrect ground connection of test equipment will result in erroneous readings.

These waveforms have been taken in the order of circuit flow through the various sections as follows:

VIDEO – Waveforms 1-4
COLOR – Waveforms 5-8
VERTICAL – Waveforms 9-13
HORIZONTAL – Waveforms 14-16
POWER SUPPLY – 17-21

Schematic Notes

- Resistors are carbon 1/4W unless noted otherwise.
- Capacitors are ceramic 50V unless noted otherwise.
- Coil value noted is inductance in μ H.
- Test point indicated by $\bullet$. Test point but no pin $\bullet$.
- When arrows (→) used connections are easily found along with direction of arrow.
- (BOLD LINES)** Indicates the route of B+ supply.
- This schematic diagram is the latest at the time of printing and subject to change without notice.
- Ground symbol (≡) indicates **HOT GROUND CONNECTION** and (≡) indicates **COLD GROUND CONNECTION**.

Voltage Measurements

- Voltage measurement:
 - AC input to Receiver is 120V. Gated rainbow generator connected to antenna of Receiver.
 - All video and audio controls set to normalized position.
 - TV Cable SW – TV position
 - NR Button – Noise Reduction Off
 - Volume – Min
 - TV Video – TV
- Voltage readings are nominal and vary $\pm 10\%$ on active devices.
- Some voltage readings will vary with signal strength and signal content.
- Supply voltages are all nominal.
- Ground symbol (≡) or (≡) indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**

Voltage Chart – A-Board

Integrated Circuits (ICs)

IC001	IC101	IC451	IC551
1 5.1	27 5.1	1 12.8	1 16.5
2 0	28 5.1	2 7.9	2 0
3 4.3	29 0.1	3 0	3 11.9
4 11.9	30 5.1	4 0.7	4 0
5 0	31 0.1	5 0	5 31.8
6 4.9	32 4.2	6 2.1	6 32.8
7 5.0	33 0.3	7 4.2	7 26.2
8 0	34 0.1	8 2.4	8 34.0
9 5.1	35 0.3	9 6.1	9 1.3
10 0	36 4.9	10 0.7	10 0
11 5.1	37 2.4	11 2.7	11 15.6
12 0.3	38 2.5	12 8.1	12 38.7
13 5.2	39 4.8	13 2.4	13 7.3
14 5.2	40 2.5	14 5.2	14 4.4
15 5.2	41 2.6	15 7.6	15 3.4
16 0.2	42 5.1	16 8.5	16 42.0
17 5.1	43 5.1	17 1.5	17 43.1
18 5.1	44 2.2	18 1.5	18 44.6
19 5.1	45 2.3	19 5.0	19 45.6
20 1.5	46 0	20 2.2	20 46.6
21 2.6	47 0	21 3.7	21 47.0
22 4.6	48 0	22 2.6	22 48.4
23 0.5	49 5.1	23 2.6	23 49.7
24 0.2	50 5.1	24 5.4	24 5.3
25 5.1	51 0	25 3.3	25 7.3
26 5.1	52 0	26 0.5	26 3.3

Transistors

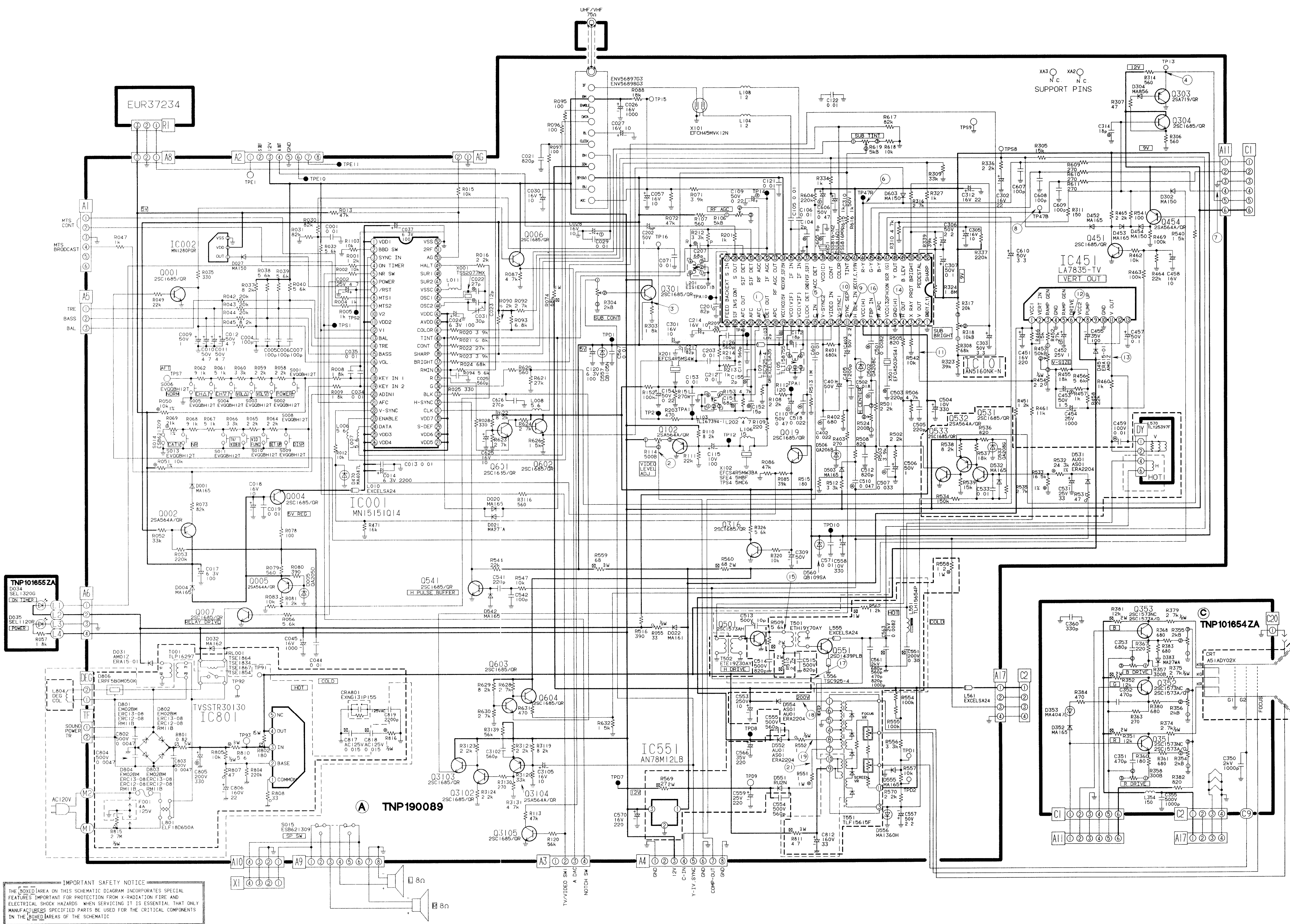
Ref.	b	c	e
Q001	0	0.2	0
Q002	6.1	0	5.1
Q004	5.7	11.3	5.1
Q005	4.9	5.7	5.7
Q006	0.2	11.9	0
Q007	0.7	0.1	0
Q019	8.5	9.1	7.9
Q102	8.7	0	9.3
Q301	3.1	11.9	2.4
Q303	4.1	0	4.8
Q304	4.4	11.9	3.7
Q316	0.7	0	0
Q451	0.6	0.1	0
Q454	11.9	0.1	11.9
Q501	0	95.4	0
Q531	7.3	11.9	7.6
Q532	11.9	0	11.9
Q533	0	4.1	0
Q541	0.2	4.2	0
Q551	0	135.4	0
Q601	1.9	1.3	1.3
Q602	1.4	9.1	0.7
Q603	1.3	9.1	0.6
Q604	2.0	1.3	1.3
Q3102	3.5	8.8	2.9
Q3103	8.8	11.9	8.2
Q3104	9.5	3.5	10.2
Q3105	0.3	2.7	0

Voltage CHART – C-Board

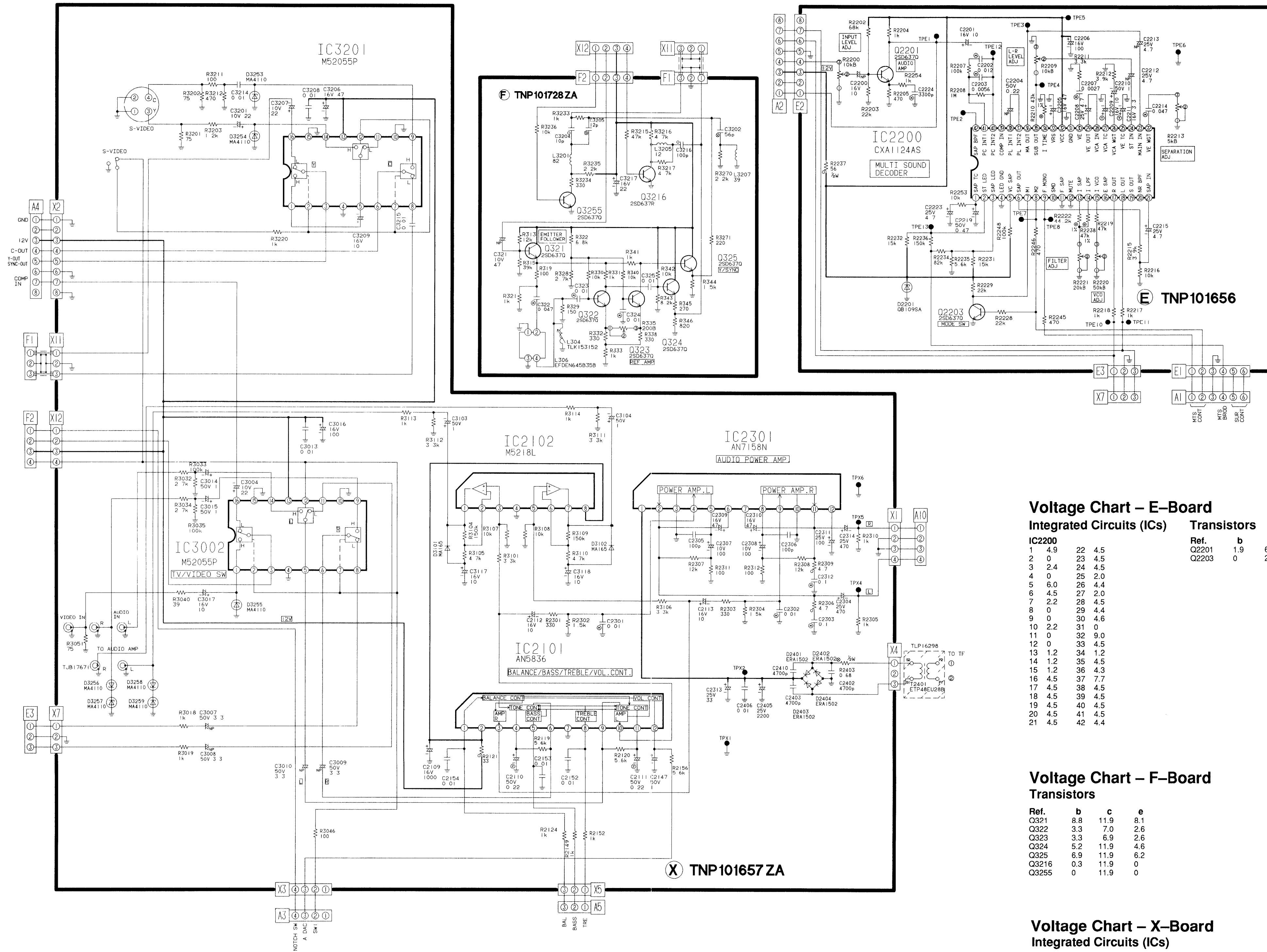
Transistors

Ref.	b	c	e
Q351	5.6	154.0	5.2
Q352	5.6	156.6	5.3
Q353	5.6	160.8	5.2

A, C & L-Board Schematic (CTM-2092S)



E, F & X-Board Schematic (CTM-2092S)



Circuit Board Function Index

(CIRCUIT BOARDS)	(FUNCTION)
A-BOARD	MAIN
C-BOARD	CRT
E-BOARD	STEREO/SAP DECODER
	DECODER/PROCESSOR
F-BOARD	COMB FILTER
L-BOARD	POWER/TIME INDICATORS
R ASSEMBLY	REMOTE RECEIVER
X-BOARD	TV/VIDEO SWITCH, AUDIO CONTROL & STEREO OUTPUT

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in μH .
4. Test point indicated by . Test point but no pin .
5. When arrows  used connections are easily found along with direction of arrow.
6. **— (BOLD LINES)** Indicates the route of B+ supply.
7. This schematic diagram is the latest at the time of printing and subject to change without notice.
8. Ground symbol  indicates **HOT GROUND CONNECTION** and  indicates **COLD GROUND CONNECTION**.

Voltage Measurements

1. Voltage measurement:
 - AC input to Receiver is 120V. Gated rainbow generator connected to antenna of Receiver.
 - All video and audio controls set to normalized position.
 - TV/Cable SW – TV position
 - Volume – Min
 - Voltage readings are nominal and vary $\pm 10\%$ on active devices.
 - Some voltage readings will vary with signal strength and picture content.
 - Supply voltages are all nominal.
2. Ground symbol  or  indicates ground lead connection of meter. **Caution: Incorrect ground connection will result in erroneous readings.**

Voltage Chart – E-Board

Integrated Circuits (ICs)	Transistors
- Microprocessors - Memory chips - Logic gates - Op-amps	- BJT (Bipolar Junction Transistors) - MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistors) - JFET (Junction Field-Effect Transistors)

IC2000	Ref. Q2201 Q2203	b 1.9 0	c 6.2 2.1	e 1.3 0
1 4.9	22 4.5			
2 0	23 4.5			
3 2.4	24 4.5			
4 0	25 2.0			
5 6.0	26 4.4			
6 4.5	27 2.0			
7 2.2	28 4.5			
8 0	29 4.4			
9 0	30 4.6			
10 2.2	31 0			
11 0	32 9.0			
12 0	33 4.5			
13 1.2	34 1.2			
14 1.2	35 4.5			
15 1.2	36 4.3			
16 4.5	37 7.7			
17 4.5	38 4.5			
18 4.5	39 4.5			
19 4.5	40 4.5			
20 4.5	41 4.5			
21 4.5	42 4.4			

Voltage Chart – F-Board

Transistors

Ref.	b	c	e
Q321	8.8	11.9	8.1
Q322	3.3	7.0	2.6
Q323	3.3	6.9	2.6
Q324	5.2	11.9	4.6
Q325	6.9	11.9	6.2
Q3216	0.3	11.9	0
Q3255	0	11.9	0

Voltage Chart – X-Board

Integrated Circuits (ICs)

IC2101	IC2102	IC2301	IC3002	IC3201
1 5.3	1 7.5	1 18.8	1 5.8	1 5.8
2 10.8	2 7.5	2 9.5	2 0.3	2 0
3 7.5	3 7.5	3 0	3 4.4	3 4.3
4 4	4 3.6	4 0	4 0	4 0
5 5.2	5 7.4	5 1.1	5 4.4	5 4.4
6 3.6	6 7.5	6 17.8	6 4.4	6 4.4
7 0	7 7.5	7 17.9	7 0.3	7 0
8 5.1	8 10.8	8 1.1	8 5.8	8 5.8
9 3.8		9 0	9 5.8	9 5.8
10 7.5		10 0	10 0	10 0
11 3.6		11 9.5	11 5.8	11 5.8
12 0.1		12 18.8	12 11.9	12 11.9
			13 5.8	13 5.8
			14 5.8	14 5.8
			15 0	15 0
			16 5.8	16 5.8